Capitalization dynamical equation of a listed company based on its price and number of shares.

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A B S T R A C T

With this text we want to express concepts and relationships that investors and speculators use daily but in a more condensed way through an dynamical equation of the capitalization of a company listed on the stock market, we intend to give a different point of view and reach new types of relationships between concepts as stock price and number of shares in circulation.

Introduction

The capitalization of a publicly traded company regardless of whether it is justified from a fundamental point of view or whether the company has a large debt
is given by the price that investors are willing to pay, assuming that the number of options convertible into shares is negligible with respect to the number of shares outstanding, the market capitalization of the company is:

$$C = nP \qquad (1)$$

Where C allude to the market capitalization of the company, n is is the number of shares of the company, P is the price of one share.
If we know $C(n, P)$ is continuous and differentiable with respect to time up to the second order for medium and large capitalization companies whose number of shares and price (except for certain moments in which large packages of shares are added or there are sharp price movements) in the interval of several seconds where it normally varies less than one percent of the price.

We can conclude:

$$dC = Pdn + ndP \qquad (2)$$

It is a simple differential equation but we can extract interesting results, for example in case the market capitalization is constant (dC=0), we can verify that the relationship between the variation in the price and the variation in the number of shares is inverse:

$$\frac{n_{after}}{n_{before}} = \frac{P_{before}}{P_{after}} \qquad (3)$$

In addition we can get the equations of velocity and acceleration in the capitalization:

$$\dot{C} = P\dot{n} + n\dot{P} \qquad (4)$$

$$\ddot{C} = P\ddot{n} + n\ddot{P} + 2\,\dot{n}\dot{P} \qquad (5)$$

Where $\dot{} = \frac{d}{dt}$; $\ddot{} = \frac{d^2}{d^2t}$

We can draw some conclusions.

First , capitalization can be accelerated without an acceleration in the number of shares or an acceleration in share prices:

$$\ddot{C} = 2\,\dot{n}\dot{P} \qquad (5)$$

Other conclusion, if accelerations of capitalization, number of shares and share price are zero ($\dot{n}\dot{P} = \mathbf{0}$) then only exist three possible solutions for the change in capitalization over time and never can exist variations in the number of shares and share price variations at the same time:

$$\dot{C} = P\dot{n} \qquad (6)$$

$$\dot{C} = n\dot{P} \qquad (7)$$

$$\dot{C} = 0 \qquad (8)$$

These equations are valid regardless of the reason that causes variations,however, these equations are not valid in cases of very serious falls or rises in a short time and therefore are applicable in cases of low or medium volatility.

Conclusions

Objectives of this letter are several, a first approximation to the detailed study of relationships between variables of capitalization, number of shares and price of a share, in addition to entering into the consequences of its variations and its dynamics, these variables are used by investors and speculators from all over the world and yet they don't have equations that could relate their changes over time connecting some variables with others and that is why I would like to take a small first step in this text.

References

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